REMARKS

Applicant respectfully requests reconsideration of the subject patent application in light of the above amendments and below remarks. Claims 1-30 are pending in the subject application. By this amendment, original claims 1-3 have been amended to more particularly point out and define the subject matter regarded as inventive. No new matter has been added to the subject application, nor has any new issue been raised by these amendments. Support for the amendments herein is found throughout the specification and drawings of the subject application.

I. Objections

Firstly, with respect to the objection to the drawings, as indicated above, Figure 1 is being corrected so that the reference character "46" is now being used to designate only the elongate groove while the reference character "47" is now used to indicate the secondary heater. Paragraph 29 of the specification is being amended at this time so as to identify the secondary heater by means of reference character 47.

In addition to the aforementioned amendment to Figure 1, it was noted by applicant's attorneys that the reference character "86" was also being used in Figure 1 to identify two different features. Accordingly, one of these reference characters has now been changed to "87" in order to properly identify the connecting bore referred to at the end of paragraph 31. The reference character "86" is used in Figure 1 and in Figures 3 and 4 to identify the valve body of the check valve.

II. Claim Rejections

Claims 1, 3, 4, 6-11, 13, 15-21, and 23-30 were rejected as being unpatentable over Teraoka (US Patent 3,417,433) in view of Gellert (US Patent 5,223,275). Applicant respectfully

traverses the rejection. It is respectfully submitted that the claims, as amended, do in fact clearly and patentably distinguish over these two references.

Firstly, claim 1 has been amended to even further distinguish over the prior art of record. Claim 1 now recites, among other things, further details concerning the check valve including, for example, the fact that the check valve has a valve member moved to the valve closing position or the valve open position by flow of the plastics material in the chamber. Similar features are recited in original claim 11. Applicant respectfully submits that no new matter is introduced by this amendment. Claim 2 has been amended since some features recited in original claim 2 are now included in claim 1.

The '433 patent, in contrast, is directed to an injection molding machine having two injection nozzles and a plurality of molds. Unlike the subject matter of the claims in this application, the molding machine described by the '433 patent is not a hot runner molding machine, as appears to be appreciated by the Examiner who has admitted that this reference does not disclose a heated manifold. In this machine, a single plasticizing unit including the rotating screw 16 feeds plastic melt to two passageways, each of which is fitted with a check valve V. Located on opposite sides of the plasticizing unit are two movable injection cylinders 3, 3', each of which contains a reciprocating plunger 5, 5'. When the cylinder 3 is in the position indicated on the left side of the drawing, its passage 4 communicates with a passage in the head 2 so as to receive a charge into the bore 24. This charge is then expelled from a forward nozzle portion 30, 30' after the latter is aligned with its mold carrier. The plunger 5 is reciprocated in the bore 24 to inject the charge into the mold.

Each plunger is operated by a piston portion which is slidable in a cylinder 6 and which is operated by suitable control fluid. It is important to note that in this molding machine, the molds on opposite sides of the center line of the machine are operated in an alternating fashion. Thus, when one of the cylinder heads 3 is moved to an operative position for the discharging of a shot of material, the other may be moved to a position at which it receives a shot for the next injection cycle. The two check valves V are required in this machine in order to permit this alternating operation as these valves permit the plasticizing unit to feed plasticized material to only one side of the machine at a time.

It will be seen from this review that present claim 1 distinguishes over this reference by reciting the following features:

a) A hot runner system for injecting plastics material from a plasticizer unit into an injection mold for molding very small plastic devices and parts (The machine of the reference, as indicated, is not a hot runner system and because it is a cold runner system, even if this machine could be used to make very small plastic devices (which is not admitted but strongly denied), its use for this purpose would result in an unacceptable wastage of plastic material);

b) A hot runner manifold that includes at least one heating arrangement for maintaining the manifold at a selected elevated temperature suitable for flow of said melted plastics material through said manifold without undesirable degradation;

c) A metering apparatus adapted to provide a precise quantity of said melted plastics material to said at least one injection apparatus, this metering apparatus having a metering chamber with "an inner end which is open at one side of an elongate portion of said feed conduit (In the reference, even if the bore 24 in each cylinder 3 could be considered a metering chamber, it is clear that this bore does not have an inner end which is open at one side of an elongate portion of the feed conduit – note that the bore 24 extends completely past the end of the passage in the head 2);

d) The injection apparatus must be "spaced a substantial distance from said metering apparatus including said inner end of the metering chamber" (In the reference, it appears that the injection apparatus is simply located at the end of the bore 24 and thus if the plunger 5 and the bore 24 are considered to be the metering apparatus in the reference, there is no distance between the injection apparatus and the metering apparatus).

In view of these several important differences, it is clear that claim 1 distinguishes over the Teraoka reference.

Turning now to the Gellert Patent No. 5,223,275, this reference is directed to a molding system having two parallel hot runner plates located one behind the other. However, this molding system is specifically directed to a system capable of injecting two different plastic materials. This is the reason why two separated hot runner plates are employed. This is not the case with

the present hot runner system which is intended for injecting a plastics material into an injection mold for molding very small plastic devices and parts. Due to the size of these very small plastic devices and parts, it is quite unlikely that they would be made with the use of two different plastics material and, as far as the applicant is aware, no injection molding system has been developed that has such a capability.

The molding machine of Gellert has a number of injection nozzles 5 which are secured to a hot runner system 6 provided between a molding cavity plate 3 and a back plate arrangement. The injection nozzles are provided with valve pins 9, each of which extends through a central melt bore 10 and which, in a closed position, has a tip end 11 inserted in a gate 12. Each valve pin extends through a hot runner system 6 which includes a sealing sleeve disk 13 located between the two hot runner manifolds 6a and 6b.

As explained near the middle of column 7 of Gellert, the lower, first hot runner manifold 6a passes the melt of the first plastic material through the hot runners 19 which are supplied with plastic material from a central opening 20. The second hot runner manifold 6b has hot runners 24 which open into a valve pin axial bore 17 for each injection nozzle for the purpose of feeding the second plastic material into the central melt bore of each nozzle.

Figure 9 of the patent clearly illustrates how the two plastic melts are combined at the end of the injection nozzle. First and second melt bores 29a and 29b carry the melt of the first plastic material into an annular space 30 in the nozzle tip. This annular space surrounds a tip end of the central melt bore 10 which carries the second plastic material. It will also be see from Figure 9 that the purpose of the valve pin 9 is to control the flow of the two plastic materials out of the

injection nozzle tip. This is explained to some extent in columns 9 and 10 of Gellert. For example, reference can be made to the passage in column 9 at lines 54 to the bottom of the column wherein it is indicated that the pin 9 is controlled in order to provide for the sequential injection molding of the first and second plastic materials for a multi-component injection molded part. In other words, the pin 9 is not part of a metering apparatus of the type described in the present application and set out in claim 1 which requires "a metering apparatus adapted to provide a precise quantity of said melted plastics material to said at least one injection apparatus, said metering apparatus including a cylinder unit forming an elongate metering chamber".

From the aforementioned review, it should be clear to the Examiner that current claim1 distinguishes over the Gellert reference in several different ways, including the following:

a) A check valve mounted in said manifold, including a valve chamber and a valve member moved by the flow of the plastics material, and allowing one-way flow of said plastic material in said feed conduit;

b) A metering apparatus adapted to provide a precise quantity of said melted plastics material to said at least one injection apparatus, said metering apparatus including a cylinder unit forming an elongate metering chamber and a ram movable in said metering chamber;

c) The metering chamber must have an inner end "which is open at one side of an elongate portion of said feed conduit and which is downstream of said check valve"; and

d) The at least one injection apparatus must be spaced a substantial distance

"from said metering apparatus including said inner end of the metering chamber" (Even if one took the position that the valve pin 9 is part of a metering apparatus (which is not admitted but specifically denied), then clearly the valve pin 9 is within the injection apparatus itself and is not separated therefrom).

It will be appreciated from the above comments that even if one were to combine the two cited references in the manner proposed by the Examiner, the resulting combination would still not have all of the features recited in claim 1. In particular, neither reference discloses a hot runner system suitable for injecting plastics material into an injection mold for molding very small plastic devices and parts as required by the preamble of claim 1. Furthermore, neither reference discloses features c) and d) listed above, that is the features of a metering chamber whose inner end is open at one side of an elongate portion of the feed conduit and the location of the injection apparatus a substantial distance from the metering apparatus, including the inner end of the metering chamber. Accordingly, it is not seen how one skilled in the construction of hot runner systems would be led as a matter of course to develop the hot runner system recited in claim 1.

With respect to independent claim 11 which is directed to a hot runner system for injecting plastics material into at least one small mold cavity, this claim clearly distinguishes over the teachings of Teraoka by reciting the following features:

1) A hot runner manifold that includes a heating arrangement for maintaining said manifold in one or more desired temperature ranges suitable for conducting said plastics material through said manifold;

2) A metering apparatus capable of providing a selected small quantity of said melted plastics material to at least one injection apparatus (Assuming that the Examiner considers that each cylinder 3 and its respective plunger 5 constitutes a metering apparatus, it is believed by the applicant that this molding machine is only suitable for molding relatively large plastic articles, this conclusion being based in part on the fact that it is a cold runner system);

3) The metering chamber must have an open inner end located on one side of one of said at least one feed conduit downstream of the check valve (As indicated, the elongate passage in which the plunger 5 moves extends past the end of the feed conduit formed in the head 2 and thus does not end at this feed conduit).

In view of these several important differences, it is clear that claim 11 does distinguish over the teachings of the Teraoka patent when considered alone.

Turning now to the cited Gellert patent, claim 11 distinguishes over the '275 patent by reciting the following features:

1) A check valve mounted in the manifold and constructed to allow only one way flow of the plastics material in the at least one feed conduit;

2) A metering apparatus capable of providing a selected small quantity of the plastic material to said at least one injection apparatus, this apparatus including an elongate metering chamber and a ram movable therein (As indicated, the elongate, movable member 9 is simply a valve needle in Gellert used to

control the flow of each of two different plastic materials through the valve gate); and

3) The metering chamber must have an open inner end located on one side of one of the at least one feed conduit downstream of the check valve and upstream of the outlet end of the at least one feed conduit (Again, even if the elongate passageway in which the pin 9 moves were to be considered a metering chamber, which is not admitted but specifically denied, its inner end, that is the delivery end, is not upstream of the outlet end of the feed conduits).

Again, the Examiner will appreciate that even if these two cited references are combined, the resulting combination would not be hot runner system recited in claim 1. One reason for this is that neither of these references teaches the important features of a metering apparatus capable of providing a selected small quantity of the melted plastics material to at least one injection apparatus, this metering apparatus being in addition to the at least one injection apparatus nor the feature of the metering chamber which has an open inner end located on one side of one of the at least one feed conduit downstream of the check valve. The latter feature in particular is advantageous as it enables precise control of the very small amount of melted plastics material that is being delivered to the mold. The metering chamber is not part of the feed conduit that leads from the check valve to the at least one injection apparatus.

Turning now to the remaining independent claim in the application, namely claim 19, the Examiner appears to appreciate that this claim already patentably distinguishes over the teachings of Teraoka when considered alone because of its requirements for a special two-part

manifold apparatus. In particular, claim 19 recites the following features which are not found in the Teraoka reference:

1) Firstly, it requires a hot runner system for injecting melted plastics material from a plasticizer unit;

2) A two-part manifold including first and second manifold sections which are located close to each other but which are spaced apart a short distance by an insulating arrangement and each of these sections must have its own feed conduit system;

3) Both a primary heater for heating the first manifold section to a first elevated temperature range and a secondary heater for heating the second manifold section to a second temperature range which is hotter than the first (As admitted by the Examiner, no heater arrangement appears to be provided for the manifold and/or injectors of the Teraoka machine).

4) The metering apparatus must be provided in the second manifold section and must be capable of delivering the desired quantity of melted plastics material "to said second conduit system at at least one location downstream from the check valve".

With respect to the secondary reference to Gellert, it will be appreciated from the above discussion concerning the teachings of this reference that claim 19 recites the following features not found in this reference:

1) A first feed conduit system formed in the first manifold section must conduct the melted plastics material to the second manifold section and, for this purpose, the

second feed conduit system must be operatively connected to the first feed conduit system (As indicated above, the two conduit systems in Gellert are not connected so that one feeds into the other system and they must be set up to deliver two different plastics material to the tip of the injector where the valve gate is located;

2) At least one check valve mounted in the manifold apparatus to provide one way flow of the melted plastics material; and

3) A metering apparatus which is provided in the second manifold section so as to deliver a desired quantity to the second conduit system at at least one location downstream from the check valve (As indicated, the Gellert reference has in fact no metering apparatus in the sense of the present invention but only a valve pin used to control the flow of each of the two plastics materials through the valve gate.

From this review, it will be seen that even if one combined the teachings of the two cited references in the manner proposed by the Examiner, a step which would not be obvious in applicant's submission, the resulting combination would still not be the hot runner system required by claim 19. This is due to the fact that neither reference in fact teaches the advantages of a two-part manifold apparatus, each having its own feed conduit system wherein the first fed conduit system is connected to the second feed conduit system so that the same melted plastics material is delivered from the first heated manifold section to the second heated manifold section. This is important in order to maintain the quality of the plastics material during the

operation of the hot runner system without significant thermal degradation of the material, bearing in mind the fact that the present hot runner system has been designed for the molding of very small plastic articles where only a small amount of material is injected in each mold cavity. Another distinguishing feature, of course, which is not found in either reference is the location of the recited metering apparatus, that is, it must be located in a second manifold section so as to deliver the desired quantity of the plastics material to the second conduit system. Even if the plunger 5 and cooperating cylinder 3 of Teraoka is considered to be a form of metering apparatus, which is not admitted, it is simply attached to a single manifold provided at the head 2.

For all of these reasons, it is submitted that all three independent claims do clearly and patentably distinguish over the combination of the cited art. Furthermore, the dependent claims which have also been rejected on the basis of this combination distinguish over the Teraoka and Gellert references for the same reasons as claims 1, 11 and 19.

With respect to the Examiner's argument that it would have been obvious to locate the check valve between the two manifold sections in light of the teachings of Teraoka, this argument appears to be directed to the subject matter of claim 7, claim 16 and claim 22. However, the Examiner will appreciate that there is in effect only one manifold section used in the Teraoka molding machine and both of the check valves are found in this single section which is not even a hot runner manifold. By locating the check valve between the two manifold sections of a hot runner system, the applicant has achieved distinct advantages which are not achieved by or suggested by Teraoka. For example, this location makes it easier to gain access to

the check valve for system maintenance purposes and it also makes it easy to construct the check valve at a reasonable cost. Furthermore, by locating the check valve in this position, the applicant has been able to separate the two portions of the plastic melt which are at different temperatures, thereby helping to maintain both portions at the required, optimal temperatures.

It is submitted that the case of In Re Japikse, 86 U.S.P.Q. 70, does not apply to this situation. In this case, the Court appeared to support the principle stated by the Patent Office that "there would be no invention in shifting the starting switch disclosed by Cannon to a different position since the operation of the device would not thereby be modified" (86 U.S.P.Q. at 73). Clearly, in the present case, by locating the check valve in the location specified in the aforementioned dependent claims, the applicant has achieved certain advantages which are not obtained by the check valves of Teraoka. Moreover, there is nothing in the teachings of Teraoka which would lead one to divide the manifold into two manifold sections and to locate the check valve between these two sections.

With respect to the Examiner's further argument that it would have been obvious to provide a plastic feed conduit with a specific size in light of the teachings of Teraoka, this objection appears to be directed to dependent claim 8 which requires that the feed conduit have a diameter "in the range of 1 to 5 millimeters" and also claim 17 and claim 29. However, with respect to these claims, it is submitted that the recited conduit sizes limit the claimed subject matter to hot runner systems clearly designed for and intended for molding very small plastic articles with the size of the conduit minimizing the amount of melted plastics material in the conduit system. These recited size limitations are important as they further distinguish the

claimed subject matter over the molding systems of the two cited references, neither of which appears to be intended for or suitable for molding very small plastic articles. In fact, as already indicated, the Teraoka molding machine, partially due to the fact that it is a cold runner system, would only be practical for molding relatively large plastic articles since otherwise the amount of plastic wasted by the system would be excessive. Accordingly, the feed conduits in the Teraoka machine would likely have to be much larger than the ranges recited in the aforementioned dependent claims.

With respect to the In Re Rose case cited by the Examiner (105 U.S.P.Q. 237), in this case the Court ruled or agreed that changing the relative dimensions of strips in a bundle, as recited in the claim in issue, is simply a matter of choice involving differences in degree and/or size and is not a patentable distinction. However, the feed conduit dimensions recited in the aforementioned dependent claim are in fact a patentable distinction since it does not appear that either cited reference would use or would be likely to use feed conduits with such a small conduit diameter, these known systems not being intended for the manufacture of very small plastic parts.

Similar comments apply to the decision in the case of In Re Reven, 156 U.S.P.Q. 679, wherein the Court held that the difference between the invention as claimed and the cited reference was a mere matter of degree and held that the burden of establishing the significance of a difference or differences recited in a claim for the purpose of evaluating obviousness falls on the applicant. For the aforementioned reasons, it is submitted that the present applicant has met this burden and that the applicant has explained why these conduit sizes are significant as such

sizes provide very desirable plastic flow advantages for a machine being used to mold very small plastic parts, advantages that would not be achieved with prior art machines intended for making much larger plastic parts.

Turning now to the rejection of dependent claims 5 and 14 on grounds of obviousness in view of the above discussed references and the teachings of a second Gellert patent, namely U.S. Patent No. 4,330,258, this objection is respectively traversed. It is respectfully submitted that the Gellert '258 patent does not in fact teach a threaded adjusting bolt as suggested by the Examiner and, even if it could be considered an adjusting bolt, which is not admitted, it does not serve the same function as the threaded adjusting bolt required by claims 5 and 14. The Gellert patent is directed to a double acting valve pin actuator for an injection molding system having a number of valve gate units aligned in a row. The actuator is a pneumatically driven toothed rack member 46 which engages a pinion member 52 having teeth 56. A bushing assembly includes a hollow bushing 60, a collar 62 and a top plate 64 which is attached to the collar by bolts as shown in Figure 4. The bushing 60 extends through the pinion member 52 and has a threaded outer surface which engages threads on the inner surface of the pinion member. An outer flange 74 at the top end of the bushing is located between the collar and the top plate 64 and, in this way, the bushing assembly and the valve pin 12 are secured as a rigid unit (see column 3, lines 25 to 41).

It will be seen from the above discussion that the member 60 identified by the Examiner as an adjusting bolt is in fact a hollow bushing with a threaded exterior. Moreover, the bushing 60 is not used as an adjusting bolt within the meaning of the present invention but rather is used as part of the actuator system for a valve pin 12 which is simply used to control the flow of

melted plastics through the injector unit. In fact, it is submitted that the Gellert reference teaches away from the hot runner system described and claimed in this application and, in particular, the structure recited in claim 4 on which claim 5 depends. Claim 4 requires that the metering apparatus include a piston member connected to an outer end of the ram and a piston housing in which the piston member is slidably movable. A pressurizing system is required for providing pressurized fluid to the piston chamber in order to drive both the piston member and the ram inwardly, thereby providing the selected quantity of plastics material. Instead of using such a piston operated system, the Gellert patent specifically teaches and requires the use of a rack and pinion system for moving the pin member which, it should be noted, is not in fact a metering apparatus.

It will thus be appreciated that claim 5 clearly and patentably distinguishes over the cited combination by requiring the following features that are not taught in any of the three applied references:

1) A threaded adjusting bolt having a central longitudinal axis aligned with the longitudinal axis of the metering chamber; and

2) An outermost limit to outward movement of the piston member and ram must be set by turning the bolt inwardly or outwardly.

Similar distinguishing features are also recited in dependent claim 14.

Turning now to the rejection of dependent claims 2, 12 and 22, on grounds of obviousness in view of the two references cited against the independent claims and U.S. Patent No. 5,246,660 to Tsutsumi, reconsideration of this rejection is also respectfully requested. The

'660 patent is directed to an injection molding system that employs a special perforated member for melt filtering and/or melt mixing during metering of the plasticized material. The perforated member can be in the form of a disk mounted to a screw plunger with the perforations arranged around the screw plunger. The Examiner has relied upon this reference on the grounds that it teaches a grooved ball valve 42 and the Examiner asserts that the use of such of a valve is conventional. In the reference, the valve means is identified by reference 40 and is shown in Figures 1 and 3. It is operated by a pulse motor (not shown) mounted on a rear part 23 and a circular valve rod 42 that extends vertically from the motor. The valve rod is rotatably disposed in the hole 30 and has a horizontal through-hole 42, which hole forms a portion of the nozzle passage Y when the valve means is in the opened position.

From this review, it will be seen that the check valve structure recited in claim 2 does in fact distinguish over that taught in the Tsutsumi patent. As noted above, some of the subject matter of original claim 2 is now in claim 1. Claim 2 now simply adds the additional limitation that the valve member is a ball movable within the chamber. The circular valve member in the reference is only rotatable between open and closed positions and it does not in fact move between upstream and downstream sides of the valve chamber. It will be appreciated by the Examiner that this is important because the check valve of the type recited in claims 1 and 2 is simply operated by the flow of the plastics material and does not need to be operated by a motor, unlike the rotatable valve in Tsutsumi.

With respect to dependent claim 12, first of all it will be noted that claim 11 on which claim 12 depends already requires that the check valve include a valve chamber and a valve

member movable within the chamber between an upstream side of the chamber and a downstream side. Claim 12 adds the further limitations that the check valve include "a valve body, which is a body separate from but attached to said manifold and in which said valve chamber is at least partially formed" and has a further limitation that the valve member be a metal ball. Claim 12 further requires that there be grooves formed in the valve body at the downstream side of the chamber, these grooves permitting flow of the melted plastics material around and past the metal ball. The recited structure distinguishes in several respects from that used in the valve of Tsutsumi. First of all, there appear to be no grooves in the Tsutsumi valve body but only the flow passageways that lead to and from the circular chamber in which the rotary valve member is located. Secondly, the rotary valve of Tsutsumi does not appear to be located in a valve body which is attached to a manifold. Rather, the rotary valve in Tsutsumi is simply located in the rear part 23 through which the melted plastic is fed from the screw member.

With respect to dependent claim 22, it is first of all noted that this claim depends upon claim 21 which requires that the check valve include both a valve chamber and a ball movable within the chamber between an upstream side of the chamber and a downstream side, requirements not met by the valve arrangement 40 in Tsutsumi. Claim 22 adds the further distinguishing limitation that the valve body be "mounted between said first and second manifold sections". As indicated, the valve structure 40 in the reference is not even mounted in a manifold and it is certainly not mounted between two manifold sections. Furthermore, claim 22 requires that there be grooves formed in the valve body in the downstream side of the valve chamber and

no such grooves are found in the valve structure of the reference. Accordingly, reconsideration and allowance of these dependent claims are also requested.

Applicant respectfully submits that none of the prior art of record, alone or in combination, discloses or suggests the invention as claimed. Based upon the foregoing, favorable consideration of Claims 1-30 is respectfully requested. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 04-1105, under Order No. 60043(71073).

Respectfully submitted,

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AMENDMENTS TO THE DRAWINGS

Please find enclosed a replacement sheet containing Figure 1. This sheet has been corrected in two respects. As required by the Examiner on page 2 of the Office Action, the second reference character "46" which referred to the secondary heater has now been replaced by – 47 --. This is the reference number that is now used in the specification to identify the secondary heater.

In addition, in order to avoid the use of the reference character "86" to identify two different features, the reference character "86" used to identify a connecting bore (see paragraph 31) has been replaced by – 87 --. Acceptance of these two amendments to Figure 1 is respectfully requested.